

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

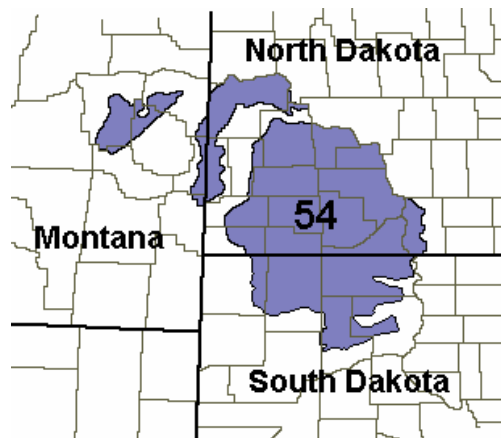
**Site Name:** Very Shallow

**Site Type:** Rangeland

**Site ID:** R054XY035ND

**Major Land Resource Area (MLRA):** 54 – Rolling Soft Shale Plain

For more information on MLRA's refer to the following web site: [http://www.essc.psu.edu/soil\\_info/soil\\_lrr/](http://www.essc.psu.edu/soil_info/soil_lrr/).



### Physiographic Features

This site typically occurs on gently undulating to rolling sedimentary uplands.

**Landform:** hill, escarpment, and ridge

**Aspect:** NA

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1600	3600
<b>Slope (percent):</b>	6	50
<b>Water Table Depth (inches):</b>	None	None
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Very low	Medium

### Climatic Features

MLRA 54 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are characteristic. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains. The air masses move unobstructed across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 18 inches per year. The normal average annual temperature is about 42°F. January is the coldest month with average temperatures ranging from about 13°F (Beach, North Dakota (ND),) to about 16°F (Bison, South Dakota (SD)). July is the warmest month with temperatures averaging from about 69°F (Beach, ND,) to about 72°F (Timber Lake, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57°F. This large annual range attests to the continental nature of this MLRA's climate. Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally

stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of native cool-season plants begins in late March and continues to early to mid July. Native warm-season plants begin growth in mid May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present.

	<u>Minimum</u>	<u>Maximum</u>
<b>Frost-free period (days):</b>	119	136
<b>Freeze-free period (days):</b>	139	157
<b>Mean Annual Precipitation (inches):</b>	14	18

**Average Monthly Precipitation (inches) and Temperature (°F):**

	<b>Precip. Min.</b>	<b>Precip. Max</b>	<b>Temp. Min.</b>	<b>Temp. Max.</b>
January	0.41	0.54	2.2	23.8
February	0.37	0.61	8.7	30.4
March	0.51	1.07	17.1	40.0
April	1.13	1.88	28.9	56.8
May	1.98	2.83	40.5	69.3
June	2.83	3.29	49.8	78.3
July	2.05	2.25	54.6	85.2
August	1.49	2.07	53.0	84.3
September	1.29	1.45	42.0	73.4
October	0.89	1.35	31.6	60.4
November	0.48	0.61	19.0	41.5
December	0.42	0.55	8.1	29.0

<b>Climate Stations</b>		<b>Period</b>	
<b>Station ID</b>	<b>Location or Name</b>	<b>From</b>	<b>To</b>
ND0590	Beach	1949	1999
MT7560	Sidney	1949	1999
SD8307	Timber Lake	1948	1999
ND2183	Dickinson FAA AP	1948	1999

For local climate stations that may be more representative, refer to <http://www.wcc.nrcs.usda.gov>.

## **Influencing Water Features**

No significant water features influence this site.

## **Representative Soil Features**

The common features of soils in this site are the loam to clay loam textured subsoil and slopes of 6 to 50 percent. The soils in this site are well drained and formed in soft siltstone, sandstone, porcelainite, or alluvium. The loam to silt loam surface layer is three to six inches thick. The soils have a moderate infiltration rate. This site should show evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is very unstable but intact. Sub-surface soil layers are restrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 15 percent. Low available water capacity caused by the shallow rooting depth

**Site Type: Rangeland**  
**MLRA: 54 – Rolling Soft Shale Plain**

**Very Shallow**  
**R054XY035ND**

strongly influences the soil-water-plant relationship. Loss of the soil surface layer can result in a shift in species composition and/or production.

Major soil series correlated to this ecological site can be found in Section II of the Natural Resources Conservation Service (NRCS) Field Office Technical Guide or the following web sites:

North Dakota: <http://www.nd.nrcs.usda.gov>.

South Dakota: <http://www.sd.nrcs.usda.gov>.

Montana: <http://www.mt.nrcs.usda.gov>.

**Parent Material Kind:** residuum or alluvium

**Parent Material Origin:** sedimentary, unspecified

**Surface Texture:** loam, silt loam, sandy loam

**Surface Texture Modifier:** channery, very channery, gravelly

**Subsurface Texture Group:** loamy

**Surface Fragments  $\leq 3''$  (% Cover):** 0-25

**Surface Fragments  $> 3''$  (%Cover):** 0-10

**Subsurface Fragments  $\leq 3''$  (% Volume):** 20-70

**Subsurface Fragments  $> 3''$  (% Volume):** 6-65

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	excessively	excessively
<b>Permeability Class:</b>	moderate	very rapid
<b>Depth to first restrictive layer (inches):</b>	5	20
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	4
<b>Sodium Absorption Ratio*:</b>	0	4
<b>Soil Reaction (1:1 Water)*:</b>	6.6	8.4
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	1	3
<b>Calcium Carbonate Equivalent (percent)*:</b>	0	10

\* - These attributes represent from 0-40 inches or to the first restrictive layer.

## Plant Communities

### Ecological Dynamics of the Site:

The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores and occasional fire. Changes will occur in the plant communities due to climatic conditions and/or management actions. Due to the nature of the soils, the site is considered very fragile. Under continued adverse impacts, a very rapid decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can very slowly return to the Historic Climax Plant Community (HCPC).

The plant community upon which interpretations are primarily based is the HCPC. The HCPC has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been considered. Subclimax plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

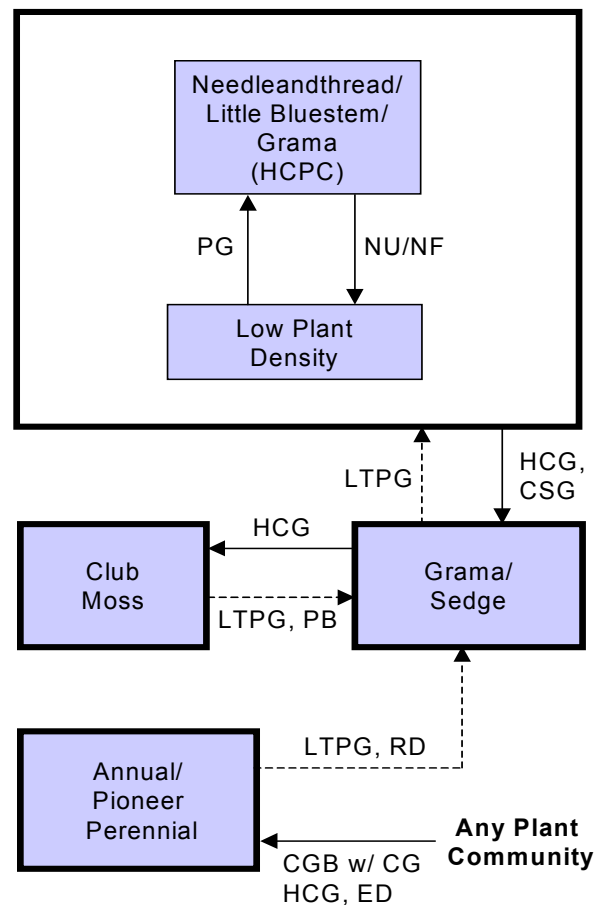
Continuous grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the HCPC. Species such as threadleaf sedge and blue grama will initially increase. Plains muhly, western wheatgrass, little bluestem, sideoats grama, and

bluebunch wheatgrass (extreme western part of MLRA 54 only) will decrease in frequency and production and later disappear. Heavy continuous grazing causes blue grama and/or threadleaf sedge to increase.

In time, heavy continuous grazing will likely cause upland sedges and blue grama to dominate and pioneer perennials, annuals, and club moss (in its range) to increase. This plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the HCPC. Runoff increases and infiltration will decrease. Soil erosion will be minimal. Extended periods of non-use and lack of fire will result in a plant community having low density with higher litter amounts, which favors an increase in cheatgrass, crested wheatgrass, Sandberg bluegrass, and sweetclover. In time, shrubs such as cactus, creeping juniper, and skunkbrush sumac will increase.

The following diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

### Plant Communities and Transitional Pathways



**CGB w/ CG** - cropped go-back with continuous grazing; **CSG** - continuous seasonal grazing; **ED** - excessive defoliation; **HCG** - heavy continuous grazing; **HCPC** - Historical Climax Plant Community; **LTPG** - long-term prescribed grazing; **NU/NF** - extended period of non-use & no fire; **PB** - prescribed burning; **PG** - prescribed grazing; **RD** - removal of disturbance.

### Plant Community Composition and Group Annual Production

		Needleandthread/Little Bluestem/Grama (HCPC)		
COMMON/GROUP NAME	SYMBOL	Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES			640 - 720	80 - 90
NEEDLEGRASS		1	80 - 160	10 - 20
needleandthread	HECOC8	1	80 - 160	10 - 20
MID WARM-SEASON		2	80 - 160	10 - 20
little bluestem	SCSC	2	80 - 120	10 - 15
plains muhly	MUCU3	2	16 - 40	2 - 5
GRAMA		3	80 - 160	10 - 20
sideoats grama	BOCU	3	40 - 80	5 - 10
blue grama	BOGR2	3	40 - 120	5 - 15
WHEATGRASS		4	40 - 80	5 - 10
western wheatgrass	PASM	4	40 - 80	5 - 10
thickspike wheatgrass	ELLAL	4	0 - 40	0 - 5
bluebunch wheatgrass	PSSP6	4	0 - 16	0 - 2
OTHER NATIVE GRASSES		5	40 - 80	5 - 10
red threeawn	ARPUL	5	8 - 24	1 - 3
sand dropseed	SPCR	5	8 - 16	1 - 2
prairie junegrass	KOMA	5	8 - 16	1 - 2
slender wheatgrass	ELTRT	5	8 - 8	1 - 1
Sandberg bluegrass	POSE	5	8 - 8	1 - 1
plains reedgrass	CAMO	5	8 - 8	1 - 1
other perennial grasses	2GP	5	0 - 8	0 - 1
GRASS-LIKES		6	16 - 40	2 - 5
threadleaf sedge	CAFI	6	16 - 40	2 - 5
other grass-likes	2GL	6	0 - 8	0 - 1
FORBS		7	40 - 64	5 - 8
American pasqueflower	PUPA5	7	8 - 8	1 - 1
blanketflower	GAAR	7	8 - 8	1 - 1
cutleaf ironplant	MAPI	7	8 - 16	1 - 2
gayfeather	LIATR	7	16 - 24	2 - 3
green sagewort	ARDR4	7	8 - 8	1 - 1
heath aster	SYER	7	8 - 8	1 - 1
Hood's phlox	PHHO	7	8 - 8	1 - 1
plains milkvetch	ASGI5	7	8 - 8	1 - 1
prairie clover	DALEA	7	16 - 24	2 - 3
prairie coneflower	RACO3	7	8 - 8	1 - 1
purple coneflower	ECAN2	7	16 - 24	2 - 3
pussytoes	ANTEN	7	8 - 8	1 - 1
rush skeletonweed	LYJU	7	8 - 8	1 - 1
scarlet gaura	GACO5	7	8 - 8	1 - 1
scarlet globemallow	SPCO	7	8 - 8	1 - 1
wild onion	ALLIU	7	0 - 8	0 - 1
yellow wild buckwheat	ERFLF	7	8 - 8	1 - 1
other perennial forbs	2FP	7	8 - 16	1 - 2
other annual forbs	2FA	7	8 - 8	1 - 1
SHRUBS		8	40 - 48	5 - 6
broom snakeweed	GUSA2	8	8 - 8	1 - 1
cactus	OPUNT	8	8 - 8	1 - 1
creeping juniper	JUHO2	8	8 - 8	1 - 1
rubber rabbitbrush	ERNA10	8	0 - 8	0 - 1
fringed sagewort	ARFR4	8	8 - 16	1 - 2
kinnikinnick	ARUV	8	0 - 8	0 - 1
rose	ROSA5	8	8 - 8	1 - 1
skunkbush sumac	RHTR	8	0 - 8	0 - 1
other shrubs	2SHRUB	8	0 - 8	0 - 1
CRYPTOGAMS		9	0 - 8	0 - 1
clubmoss	SEDE2	9	0 - 8	0 - 1
Annual Production lbs./acre		LOW RV HIGH		
GRASSES & GRASS-LIKES		330 - 700 - 1075		
FORBS		35 - 52 - 65		
SHRUBS		35 - 44 - 50		
CRYPTOGAMS		0 - 4 - 10		
TOTAL		400 - 800 - 1200		

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative Value.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	Needleandthread/Little Bluestem/Grama (HCPC)			Grama/Sedge			Low Plant Density			Club Moss		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			640 - 720	80 - 90		200 - 225	80 - 90		480 - 540	80 - 90		140 - 160	70 - 80
<b>NEEDLEGRASS</b>		1	80 - 160	10 - 20	1	8 - 15	3 - 6	1	90 - 120	15 - 20	1	6 - 12	3 - 6
needleandthread	HECOC8	1	80 - 160	10 - 20	1	8 - 15	3 - 6	1	90 - 120	15 - 20	1	6 - 12	3 - 6
<b>MID WARM-SEASON</b>		2	80 - 160	10 - 20	2	0 - 5	0 - 2	2	30 - 60	5 - 10	2	0 - 4	0 - 2
little bluestem	SCSC	2	80 - 120	10 - 15	2	0 - 5	0 - 2	2	30 - 60	5 - 10	2	0 - 4	0 - 2
plains muhly	MUCU3	2	16 - 40	2 - 5	2	0 - 3	0 - 1	2	12 - 30	2 - 5			
<b>GRAMA</b>		3	80 - 160	10 - 20	3	50 - 75	20 - 30	3	60 - 90	10 - 15	3	30 - 50	15 - 25
sideoats grama	BOCU	3	40 - 80	5 - 10	3	0 - 3	0 - 1	3	12 - 30	2 - 5			
blue grama	BOGR2	3	40 - 120	5 - 15	3	50 - 75	20 - 30	3	30 - 60	5 - 10	3	30 - 50	15 - 25
<b>WHEATGRASS</b>		4	40 - 80	5 - 10	4	5 - 13	2 - 5	4	30 - 60	5 - 10	4	2 - 6	1 - 3
western wheatgrass	PASM	4	40 - 80	5 - 10	4	5 - 13	2 - 5	4	30 - 60	5 - 10	4	2 - 6	1 - 3
thickspike wheatgrass	ELLAL	4	0 - 40	0 - 5	4	0 - 3	0 - 1	4	0 - 30	0 - 5	4	0 - 2	0 - 1
bluebunch wheatgrass	PSSP6	4	0 - 16	0 - 2				4	0 - 12	0 - 2			
<b>OTHER NATIVE GRASSES</b>		5	40 - 80	5 - 10	5	8 - 13	3 - 5	5	30 - 60	5 - 10	5	6 - 12	3 - 6
red threeawn	ARPUL	5	8 - 24	1 - 3	5	5 - 8	2 - 3	5	12 - 24	2 - 4	5	4 - 6	2 - 3
sand dropseed	SPCR	5	8 - 16	1 - 2	5	5 - 8	2 - 3	5	6 - 12	1 - 2	5	2 - 4	1 - 2
prairie junegrass	KOMA	5	8 - 16	1 - 2	5	3 - 3	1 - 1	5	6 - 12	1 - 2	5	0 - 2	0 - 1
slender wheatgrass	ELTRT	5	8 - 8	1 - 1	5	3 - 3	1 - 1	5	6 - 6	1 - 1			
Sandberg bluegrass	POSE	5	8 - 8	1 - 1	5	5 - 8	2 - 3	5	6 - 6	1 - 1	5	2 - 4	1 - 2
plains reedgrass	CAMO	5	8 - 8	1 - 1				5	6 - 6	1 - 1			
other perennial grasses	2GP	5	0 - 8	0 - 1	5	0 - 3	0 - 1	5	0 - 6	0 - 1	5	0 - 2	0 - 1
<b>GRASS-LIKES</b>		6	16 - 40	2 - 5	6	50 - 75	20 - 30	6	30 - 60	5 - 10	6	30 - 50	15 - 25
threadleaf sedge	CAFI	6	16 - 40	2 - 5	6	50 - 75	20 - 30	6	30 - 60	5 - 10	6	30 - 50	15 - 25
other grass-like	2GL	6	0 - 8	0 - 1	6	0 - 3	0 - 1	6	6 - 12	1 - 2	6	0 - 2	0 - 1
<b>NON-NATIVE GRASSES</b>		7			7	0 - 3	0 - 1	7	0 - 24	0 - 4	7		
cheatgrass	BRTE							7	0 - 24	0 - 4			
crested wheatgrass	AGCR				7	0 - 3	0 - 1	7	0 - 24	0 - 4			
<b>FORBS</b>		8	40 - 64	5 - 8	8	13 - 25	5 - 10	8	30 - 60	5 - 10	8	10 - 20	5 - 10
American pasqueflower	PUPA5	8	8 - 8	1 - 1	8	5 - 8	2 - 3	8	6 - 6	1 - 1	8	4 - 6	2 - 3
blanketflower	GAAR	8	8 - 8	1 - 1				8	6 - 6	1 - 1			
common dandelion	TAOF				8	3 - 5	1 - 2	8	6 - 6	1 - 1	8	2 - 4	1 - 2
curlycup gumweed	GRSQ				8	3 - 5	1 - 2	8	0 - 6	0 - 1	8	2 - 4	1 - 2
cutleaf ironplant	MAPI	8	8 - 16	1 - 2	8	3 - 5	1 - 2	8	6 - 12	1 - 2	8	2 - 4	1 - 2
gayfeather	LIATR	8	16 - 24	2 - 3	8	3 - 3	1 - 1	8	12 - 18	2 - 3	8	0 - 2	0 - 1
green sagewort	ARDR4	8	8 - 8	1 - 1	8	5 - 8	2 - 3	8	6 - 6	1 - 1	8	4 - 6	2 - 3
heath aster	SYER	8	8 - 8	1 - 1	8	3 - 5	1 - 2	8	6 - 6	1 - 1	8	2 - 4	1 - 2
Hood's phlox	PHHO	8	8 - 8	1 - 1	8	3 - 3	1 - 1	8	6 - 6	1 - 1	8	2 - 2	1 - 1
plains milkvetch	ASGI5	8	8 - 8	1 - 1	8	0 - 3	0 - 1	8	6 - 6	1 - 1			
prairie clover	DALEA	8	16 - 24	2 - 3				8	12 - 18	2 - 3			
prairie coneflower	RACO3	8	8 - 8	1 - 1	8	5 - 8	2 - 3	8	6 - 6	1 - 1	8	4 - 6	2 - 3
purple coneflower	ECAN2	8	16 - 24	2 - 3	8	3 - 3	1 - 1	8	12 - 18	2 - 3			
pussytoes	PEES	8	8 - 8	1 - 1	8	3 - 3	1 - 1	8	6 - 6	1 - 1	8	2 - 4	1 - 2
rush skeletonweed	LYJU	8	8 - 8	1 - 1	8	3 - 5	1 - 2	8	6 - 6	1 - 1	8	2 - 4	1 - 2
scarlet gaura	GACO5	8	8 - 8	1 - 1				8	6 - 6	1 - 1			
scarlet globemallow	SPCO	8	8 - 8	1 - 1	8	3 - 5	1 - 2	8	6 - 6	1 - 1	8	2 - 4	1 - 2
sweetclover	MELIL				8	0 - 3	0 - 1	8	0 - 30	0 - 5			
western salsify	TRDU				8	3 - 3	1 - 1	8	6 - 6	1 - 1	8	2 - 2	1 - 1
wild onion	ALLIU	8	0 - 8	0 - 1	8	0 - 3	0 - 1	8	6 - 6	1 - 1			
woolly indianwheat	PLPA2				8	3 - 3	1 - 1	8	0 - 6	0 - 1	8	2 - 2	1 - 1
yellow wild buckwheat	ERFLF	8	8 - 8	1 - 1	8	3 - 3	1 - 1	8	6 - 6	1 - 1			
other perennial forbs	2FP	8	8 - 16	1 - 2	8	3 - 5	1 - 2	8	6 - 12	1 - 2	8	2 - 4	1 - 2
other annual forbs	2FA	8	8 - 8	1 - 1	8	3 - 3	1 - 1	8	6 - 6	1 - 1	8	2 - 2	1 - 1
<b>SHRUBS</b>		9	40 - 48	5 - 6	9	10 - 18	4 - 7	9	30 - 60	5 - 10	9	10 - 16	5 - 8
broom snakeweed	GUSA2	9	8 - 8	1 - 1	9	5 - 8	2 - 3	9	6 - 6	1 - 1	9	4 - 6	2 - 3
cactus	OPUNT	9	8 - 8	1 - 1	9	3 - 5	1 - 2	9	12 - 18	2 - 3	9	4 - 6	2 - 3
creeping juniper	JUHO2	9	8 - 8	1 - 1	9	5 - 8	2 - 3	9	18 - 24	3 - 4	9	0 - 2	0 - 1
rubber rabbitbrush	ERNA10	9	0 - 8	0 - 1	9	0 - 5	0 - 2	9	0 - 6	0 - 1	9	0 - 2	0 - 1
fringed sagewort	ARFR4	9	8 - 16	1 - 2	9	5 - 8	2 - 3	9	6 - 12	1 - 2	9	4 - 6	2 - 3
kinnikinnick	ARUV	9	0 - 8	0 - 1				9	0 - 6	0 - 1			
rose	ROSA5	9	8 - 8	1 - 1	9	3 - 3	1 - 1	9	6 - 12	1 - 2	9	0 - 2	0 - 1
skunkbush sumac	RHTR	9	0 - 8	0 - 1				9	0 - 6	0 - 1			
other shrubs	2SHRUB	9	0 - 8	0 - 1	9	0 - 3	0 - 1	9	0 - 6	0 - 1	9	0 - 2	0 - 1
<b>CRYPTOGAMS</b>		10	0 - 8	0 - 1	10	0 - 10	0 - 4	10	0 - 6	0 - 1	10	20 - 30	10 - 15
clubmoss	SEDE2	10	0 - 8	0 - 1	10	0 - 10	0 - 4	10	0 - 6	0 - 1	10	20 - 30	10 - 15
<b>Annual Production lbs./acre</b>													
<b>GRASSES &amp; GRASS-LIKES</b>			LOW	RV	HIGH		LOW	RV	HIGH		LOW	RV	HIGH
			330 - 700	-1075			135 - 213	-285			300 - 507	-760	
<b>FORBS</b>			35 - 52	-65			10 - 19	-30			25 - 45	-65	
<b>SHRUBS</b>			35 - 44	-50			5 - 14	-20			25 - 45	-65	
<b>CRYPTOGAMS</b>			0 - 4	-10			0 - 5	-15			0 - 3	-10	
<b>TOTAL</b>			400 - 800	-1200			150 - 250	-350			350 - 600	-900	

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. RV = Representative value.

### Plant Community and Vegetation State Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities” (DPC). According to the USDA NRCS National Range and Pasture Handbook, DPC’s will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

#### Needleandthread/Little Bluestem/Grama Plant Community

This is the interpretive plant community and is considered to be the HCPC. This community evolved with grazing by large herbivores and occasional prairie fire. It is well suited for grazing by domestic livestock and can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use and adequate recovery periods following each grazing event.

The potential vegetation is about 85 percent grasses or grass-like plants, 8 percent forbs, 6 percent shrubs, and 1 percent cryptogams. An even mix of both cool and warm-season grasses dominates this plant community. The major grasses include needleandthread, western wheatgrass, little bluestem, and both sideoats and blue grama. Other grasses occurring on the site include green needlegrass and/or porcupine grass, thickspike wheatgrass, bluebunch wheatgrass, plains muhly, red threeawn, and sedges. The significant forbs include gayfeather, purple coneflower, prairie clover, and cutleaf ironplant. Significant shrubs are fringed sagewort, creeping juniper, and rose.

This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle, and energy flow are functioning at the sites potential. Plant litter is properly distributed with some movement offsite and natural plant mortality is low. The diversity in plant species allows for high drought tolerance.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal year:

Growth curve number: ND5402

Growth curve name: Missouri Slope, Native Grasslands, Cool/Warm-season Mix.

Growth curve description: Cool-season/tall warm-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	6	21	40	20	6	4	1	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Non-use and no fire for extended periods of time will convert this plant community to the *Low Plant Density Plant Community*.
- Heavy, continuous grazing or continuous seasonal grazing (spring) will convert the plant community to the *Grama/Sedge Plant Community*.
- Excessive defoliation (i.e., areas of heavy animal concentration) will convert the plant community to the *Annual/Pioneer Perennial Plant Community*.

- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

### Grama/Sedge Plant Community

This plant community can very quickly develop from the adverse effects of long-term, heavy, continuous grazing and/or continuous seasonal grazing (annual, early spring seasonal grazing) and/or repeated wildfires. Annual, grazing too early in the spring depletes stored carbohydrates, resulting in weakening and eventual death of the cool season mid-grasses. Short grasses and forbs increase to dominate the site and annual production decreases dramatically. Lack of litter and reduced vigor result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives blue grama and sedges a highly competitive advantage over cool and warm-season mid-grasses. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur. Blue grama and threadleaf sedge are the dominant grass/grass-like species. Other grasses include western wheatgrass, needleandthread, little bluestem, plains muhly, prairie Junegrass, and red threeawn. Significant forbs include American pasqueflower, green sagewort, cutleaf ironplant, rush skeletonweed, prairie coneflower, and scarlet globemallow. There is usually less than 20 percent bare ground. The significant shrubs include broom snakeweed, cactus, and fringed sagewort.

This plant community is relatively stable. The competitive advantage of blue grama and threadleaf sedge prevents other species from establishing. This plant community is less productive than the HCPC. Runoff has increases and infiltration has decreased. Soil erosion will be minimal due to the “sod-like” habit of blue grama.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal year:

Growth curve number: ND5405

Growth curve name: Missouri Slope, Warm-season Short Grass.

Growth curve description: Warm season, short grass dominant, and some sedge.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	1	7	18	33	26	10	4	1	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Long-term prescribed grazing that includes changing season of use and allowing adequate recovery periods to enhance cool season grasses will slowly lead this plant community back to the *Needleandthread/Little Bluestem/Grama Plant Community*.
- Heavy, continuous grazing will cause further deterioration resulting in a shift to the *Club Moss Plant Community*.
- Excessive defoliation (i.e., areas of heavy animal concentration) will convert the plant community to the *Annual/Pioneer Perennial Plant Community*.
- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

### Low Plant Density Plant Community

This plant community develops after an extended period of 15 or more years of non-use by herbivores and no fire. Plant litter may accumulate as this plant community first develops. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to colonies. Standing decadent plants and moderate litter covers shorter understory species (i.e., short grasses and sedges), restricting their ability to capture adequate



sunlight for photosynthesis. Vigor and diversity of native plants are reduced. Annual and/or biennial forbs, annual grasses, and cryptogams commonly fill interspaces once occupied by desirable species.

Crested wheatgrass, cheatgrass, and/or sweetclover may invade this plant community. All native plants present in the HCPC may be present in this state, but in less vigor and health. The common forbs include American pasqueflower, green sagewort, gayfeather, and purple coneflower. Fringed sagewort, cactus, creeping juniper, and skunkbrush sumac are the principal shrubs and tend to increase in density and cover.

This plant community is resistant to change without prescribed grazing. Grazing is the most effective treatment in moving this plant community towards the HCPC. Soil erosion is low. Compared to the HCPC, infiltration and runoff is similar. Once this plant community is reached, any of the preferred treatments can readily return the diversity and production of the site.

The following growth curve represents monthly percentages of total annual growth of the dominant species during a normal year:

Growth curve number: ND5406

Growth curve name: Missouri Slope, Introduced Cool-season Grasses.

Growth curve description: Introduced cool-season grasses.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	35	35	5	2	8	2	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Prescribed grazing or prescribed burning followed by prescribed grazing will move this plant community toward the *Needleandthread/Little Bluestem/Grama Plant Community (HCPC)*. This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.

### **Club Moss Plant Community**

This plant community typically occurs in the western portion of MLRA 54. A dense sod of club moss dominates this plant community. Club moss occupies bare soil areas within deteriorated or disturbed higher successional plant communities due to long-term repeated disturbances. Club moss cover is often 25 percent or greater. Club moss creates a more arid microclimate, resulting in extreme competition for available moisture. Vigor and production of other species is reduced dramatically.

Grasses and grass-like plants include needleandthread, blue grama, red threeawn, Sandberg bluegrass, and upland sedges. Forbs commonly found in this plant community include American pasqueflower, green sagewort, cutleaf ironplant, prairie coneflower, scarlet globemallow, and scurfpea. Significant shrubs include broom snakeweed, cactus, and fringed sagewort. When compared to the HCPC, blue grama, sedges and club moss have increased, while all cool and warm-season mid grasses have significantly decreased or disappeared.

This plant community is very resistant to change. The thick sod and competitive advantage of both the clubmoss and the blue grama prevents other species from expanding and establishing. This plant community is far less productive than the HCPC. Initial runoff rates are low but then increase as clubmoss becomes saturated. Once clubmoss has been saturated then runoff increases and infiltration decreases as compared HCPC. Soil erosion will be minimal due to the sod forming habit of both the clubmoss and blue grama.

The following growth curve represents monthly percentages of total annual growth of the dominant species during a normal year:

Growth curve number: ND5404

Growth curve name: Missouri Slope, Warm-season Dominant, Cool-season Subdominant.

Growth curve description: Short warm-season dominant, mid cool-season subdominant and club moss.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	1	5	20	38	25	8	3	0	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Long-term prescribed grazing and/or prescribed burning will eventually convert this plant community to the *Grama/Sedge Plant Community*.
- Long-term prescribed grazing that includes changing season of use and allowing adequate recovery periods to enhance cool season grasses will slowly lead this plant community back to the *Needleandthread/Little Bluestem/Grama Plant Community*.
- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.
- Excessive defoliation (i.e., areas of heavy animal concentration,) will convert the plant community to the *Annual/Pioneer Perennial Plant Community*.

### Annual/Pioneer Perennial Plant Community

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, and cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include red threeawn, sixweeks fescue, crested wheatgrass, annual brome, smooth brome, needleandthread, prairie Junegrass, and little bluestem. Forbs found may include curlycup gumweed, salsify, kochia, thistles, western ragweed, prostrate verbena, and other early successional species. Shrubs that may be present include prairie rose and broom snakeweed. The community is somewhat susceptible to invasion of non-native species due to severe soil disturbances and relatively high percent of bare ground. Compared to the HCPC, little bluestem, sideoats grama, and blue grama have disappeared.

This plant community is very resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates. Significant economic inputs, management, and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community will take a long time in order to improve the production capability, but management changes would be needed to maintain any plant community that develops. The total annual production ranges from 100 to 400 lbs./ac. (air-dry weight) depending upon growing conditions.

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Under long-term prescribed grazing and/or removal of disturbance, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to a plant community resembling the (HCPC) *Needleandthread/Little Bluestem/Grama Plant Community*. This process will likely take a long period of time (50+ years). Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly.

## **Ecological Site Interpretations**

### **Animal Community – Wildlife Interpretations**

-- Under Development --

**Needleandthread/Little Bluestem/Grama Plant Community:**

**Grama/Sedge Plant Community:**

**Club Moss Plant Community:**

**Low Plant Density Plant Community:**

**Annual/Pioneer Perennial Plant Community:**

## Animal Preferences (Quarterly – 1,2,3,4<sup>†</sup>)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-like</b>							
blue grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
bluebunch wheatgrass	U P D D	P P P P	U P D D	D D D D	D D D D	U P D D	U P D D
cheatgrass	U D U U	N P U N	U D U U	N P U N	N P U N	U D U U	U D U U
crested wheatgrass	U P U D	U P N N	U P U D	U P N N	U P N N	U P U D	U P U D
little bluestem	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
plains reedgrass	U D U U	N D N N	U D U U	N D N N	N D N N	U D U U	U D U U
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
red threeawn	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
sand dropseed	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
Sandberg bluegrass	N U N N	N D N N	N U N N	N D N N	N D N N	N U N N	N U N N
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
slender wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
thickspike wheatgrass	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
threadleaf sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
western wheatgrass	U P D U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
<b>Forbs</b>							
American pasqueflower	N N N N	N U N N	N N N N	N U N N	N U N N	N N N N	N N N N
blanketflower	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
cutleaf ironplant	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
green sagewort	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
Hood's phlox	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U P P U
prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
pussytoes	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
rush skeletonweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
scarlet gaura	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
scarlet globemallow	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U D D U
wild onion	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
yellow wild buckwheat	N N U N	N N U N	N N U N	N N U N	N N U N	N N U N	N N U N
<b>Shrubs</b>							
broom snakeweed	N N N N	U U U U	N N N N	U U U U	U U U U	N N N N	U U U U
cactus	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
creeping juniper	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
kinnikinnick	N N N N	D U D P	N N N N	D U D P	D U U D	N N N N	D U D P
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
rubber rabbitbrush	N N N N	D U U D	N N N N	D U U D	U D D U	N N N N	D U U U
skunkbush sumac	D U U D	D U U D	D U U D	D U U D	D U U D	D U U D	D U U D
<b>Cryptogams</b>							
clubmoss	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N

N = not used; U = undesirable; D = desirable; P = preferred; T = toxic

<sup>†</sup> Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

## Animal Community – Grazing Interpretations

The following table lists suggested initial stocking rates for cattle under continuous grazing (year long grazing or growing season long grazing) under normal growing conditions; however, *continuous grazing is not recommended*. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process and may need to be adjusted due to diet preferences of other types or kinds of livestock and/or other factors. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Production (lbs./acre)	Carrying Capacity <sup>1</sup> (AUM/acre)
Needleandthread/Little Bluestem/Grama	800	0.25 <sup>2</sup>
Grama/Sedge	250	0.08
Low Plant Density	600	0.19 <sup>2</sup>
Club Moss	200	0.06 <sup>2</sup>
Annual/Pioneer Perennial	-- <sup>3</sup>	-- <sup>3</sup>

<sup>1</sup> Continuous season-long grazing by cattle under average growing conditions.

<sup>2</sup> Stocking rates may need to be adjusted due to palatability and/or availability of forage.

<sup>3</sup> Highly variable; stocking rate needs to be determined onsite.

## Hydrology Functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group A. Infiltration varies from rapid to very rapid and runoff varies from very low to medium depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where short grasses form a dense sod and dominate the site. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook, for runoff quantities and hydrologic curves).

## Recreational Uses

This site provides hunting opportunities for upland game species. The wide varieties of plants, which bloom from spring until fall, have an esthetic value that appeals to visitors.

## Wood Products

No appreciable wood products are present on the site.

## Other Products

Selected seed harvest of certain unique native plant species can provide additional income.

## Supporting Information

### Associated Sites

- |                               |                           |
|-------------------------------|---------------------------|
| (054XY021ND) – Shallow Clayey | (054XY038ND) – Thin Loamy |
| (054XY030ND) – Shallow Loamy  | (054XY034ND) – Thin Sands |
| (054XY043ND) – Shallow Sandy  | (054XY045ND) – Limy Sands |

### Similar Sites

- (054XY028ND) – Shallow Clayey (SwCy)  
[Well drained soils more than 10 less than 20 inches to unweathered shales that restricts root penetration. Upslope of clayey site, surface layer will ribbon greater than two inches, upslope of clayey ecological site. Indicator species: western wheatgrass dominates with little bluestem, plains muhly and sideoats grama, gayfeather. This site has similar species but less needleandthread, blue grama and little bluestem, more plains muhly, green needlegrass, western wheatgrass, restrictive layer below 10 inches down to 20 inches to unweathered shales, more production.]
- (054XY030ND) – Shallow Loamy (SwLy)  
[Well drained soils more than 10 less than 20 inches to sedimentary bedrock that restricts root penetration. Surface layer will ribbon less than two inches and greater than one inch. Upslope from thin loamy or loamy sites and some times down slope form very shallow ecological sites. Indicator species: little bluestem, plains muhly, needle grasses and sideoats grama, with dotted gayfeather, pasqueflower, purple coneflower and purple prairie clover, and shrubs like broom snakeweed. This site has similar species but less needleandthread, blue grama and little bluestem, more plains muhly, green needlegrass, western wheatgrass, restrictive layer below 10 inches down to 20 inches to sedimentary bedrock, more production.]
- (054XY043ND) – Shallow Sandy (SwSy)  
[Some what excessively drained soils more than 10 less than 20 inches to sedimentary sandstone bedrock and/or gravels that restricts root penetration. Surface layer will ribbon less than one inch unless above gravels than more than one but less than two inches. Upslope from thin loamy, limy sands, sands or sandy sites and some times down slope form very shallow ecological sites. Indicator species: little bluestem, prairie sandreed, sand bluestem, and needle grasses, with dotted gayfeather, pasqueflower, purple coneflower and purple prairie clover, and shrubs like prairie rose and yucca. This site has similar species but less needleandthread, blue grama and little bluestem, more prairie sandreed, sand bluestem, restrictive layer below 10 inches down to 20 inches to sedimentary sandstone bedrock or gravels, more production.]
- (054XY033ND) – Thin Claypan (TCp)  
[Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil above 6 inches and with salts above 16 inches that restricts root penetration. Usually found in micro relief within Claypan sites, indicator species are western wheatgrass, Sandberg's bluegrass with an understory of blue grama and buffalograss, heath aster, cudweed sagewort and western yarrow along with a few shrubs of fringed sagewort, cactus, and Nuttall's Saltbush. This site has no little bluestem, less steeper slopes, similar production, and a different restrictive layer.]

## Inventory Data References

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. All descriptions were peer reviewed and/or field tested by various private, state, and federal agency specialists.

Those involved in developing this site description include: Dennis Froemke, NRCS Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell VanderBusch, Resource Soil Scientist.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	6	1968 – 1970	ND	Slope
Ocular estimate	2	2000 – 2001	ND	Dunn, Stark

## State Correlation

This site has been correlated with Montana and South Dakota in MLRA 54.

## Field Offices

Baker, MT	Buffalo, SD	Faith, SD	Mott, ND
Beach, ND	Carson, ND	Hettinger, ND	Selfridge, ND
Beulah, ND	Culbertson, MT	Killdeer, ND	Sidney, MT
Bison, SD	Dickinson, ND	Mandan, ND	Watford City, ND
Bowman, ND	Dupree, SD	McIntosh, SD	Wibaux, MT

## Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43a – Missouri Plateau.

## Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://hpccsun.unl.edu>).

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://www.wcc.nrcs.usda.gov>).

USDA, NRCS. National Range and Pasture Handbook, September 1997.

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://nasis.nrcs.usda.gov>).

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

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State Range Management Specialist

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Date

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State Range Management Specialist

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